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ABSTRACT

The major purpose of a project has been to develop an instructional program for training water treatment technicians through the cooperative efforts of industry, the regulatory agency (West Virginia State Department of Health), and vocational education. After the appropriate job competencies were identified, a program was developed combining a competency-based format, modules of instruction, and provision for open entry/open exit. The twelve curriculum modules developed deal with the following: general plant operation; taste, odor, and color; chemistry/bacteriology; chlorination; fluoridation; filtration; hydraulics; distribution systems; pumps; wells; cross connections; and springs. The curriculum was pilot tested in an adult education setting with persons employed as "operators in training" in Class I and II (lower of four levels) water treatment plants. The curriculum was designed so that it may be used in both a postsecondary setting for new trainees and in an adult education setting for either new trainees or for upgrading presently employed water treatment technicians. Appended materials include the following: a sample student competency sheet which identifies a competency, its objectives, list of necessary resources, learning activities, and evaluation activities; a list of 61 finalized competencies; a product evaluation form; and a bibliography. (Author/BL)

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FINAL REPORT:

DEVELOPMENT OF A COMPETENCY-BASED CURRICULUM FOR UPGRADING WATER TREATMENT TECHNICIANS

Submitted to:

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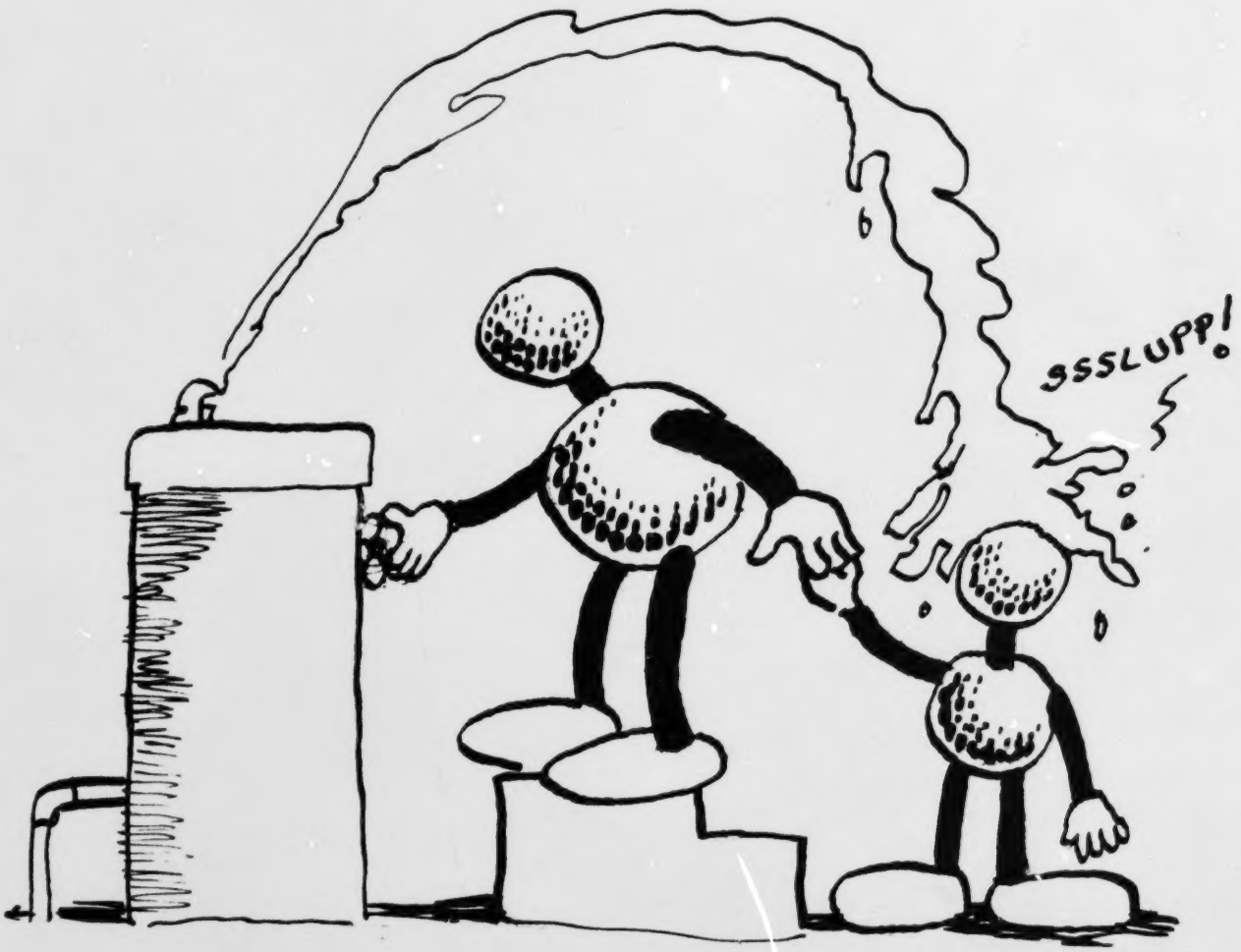

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ABSTRACT

The major purpose of this project has been to develop an instructional program for training water treatment technicians. The program combines a competency based format, modules of instruction, and provision for open-entry/open-exit. The curriculum developed was pilot tested in an adult education setting with persons employed as "Operators in Training" in Class I and II ("lower" of four levels) water treatment plants. The curriculum was designed so that it may be used in both a post-secondary setting for new trainees and in an adult education setting for either new trainees or for upgrading presently employed water treatment technicians.

The twelve curriculum modules developed were:

General Plant Operation	Hydraulics
Taste, Odor, and Color	Distribution Systems
Chemistry/Bacteriology	Pumps
Chlorination	Wells
Fluoridation	Cross-Connections
Filtration	Springs

INTRODUCTION

The major purpose of this project has been to develop an instructional program for training water treatment technicians. The program combines a competency based format, modules of instruction, and provision for open-entry/open-exit. The curriculum developed can be used in both a post-secondary setting for new trainees and in an adult education setting for either new trainees or for upgrading presently employed water treatment technicians.

PURPOSE

Public awareness of problems of treating water for human consumption and changing technology in water treatment and testing processes imply the need for the acquisition of higher level competencies by water treatment operators. In 1974 higher standards for water treatment facilities in West Virginia were issued. Revised regulations will be issued again in the autumn of 1977. The water suppliers have not, for the most part, been able to upgrade water treatment personnel to meet the standards.

The objectives of this project have been:

1. To demonstrate the feasibility and advantages of cooperative educational efforts among the employing industry, the regulatory agency and vocational education.
2. To determine the competencies needed by water treatment technicians to meet certification standards and work effectively and efficiently in a water treatment facility.
3. To develop a curriculum (instructional program) which;

a. is based on the determined competencies

b. makes use of short modules and self-paced modes of instruction

c. is open-entry/open-exit and provides developmental (remedial) instruction for those students with minor deficiencies for entering the curriculum

d. uses audio-visual aids to supplement instruction

e. makes use of actual equipment and processes in a laboratory setting and at a work site

f. is easily transportable to various locations.

4. To develop instruments and strategies for assessing level of program placement and for final competency attainment.

5. To pilot test the instructional modules as they are developed.

6. To evaluate the curriculum materials and teaching aids as a result of pilot testing and revise as needed.

7. To evaluate project outcomes by;

a. obtaining reactions, comments and competency ratings from pilot test instructors and students.

b. employer (consultants) review and rating

c. staff evaluation and observations.

RESPONSIBILITY TO CONSUMERS

At this writing in July, 1977 there are approximately 800 water treatment plants in West Virginia. Approximately 500 certified water treatment operators are responsible for these plants.

Water treatment plants in West Virginia fall into two categories. Those plants which are operating at least 60 days per year with 15 or more service connections are called Community Public Water Supplies. The remaining plants are called *Non*community Public Water Supplies. These plants operate for less than 60 days a year and have less than 15 service connections. In many cases they involve road side restaurants, camping areas and the like. At present, the noncommunity supplies are not required to be serviced by certified operators. However, in two years the West Virginia State Regulations will require that every community and noncommunity public water supply be serviced by a certified water treatment operator. This will involve the addition of approximately *2,000* treatment plants to the West Virginia system. West Virginia Health Department officials stress that no more than 8-10 of the noncommunity supplies could be properly serviced by one certified operator. As of the fall of 1979 a minimum of an additional 200 certified operators must be brought on to serve consumers. The need for an efficient, effective educational training program for water treatment operators in West Virginia is apparent.

BACKGROUND

In the past, a four and one-half day "short course" has been the only instruction provided by the West Virginia Department of Health for training water treatment operators. It has followed primarily a lecture format. During the last half day of the course, the certification examinations have been administered. "Pass" rates on the certification exam often do not approach even 50%.

Donald Kuntz, Sanitation Engineer with the West Virginia Department of Health, made the following observations about the "short course" training program:

1. It is not tailored to operator deficiencies.
2. One manual is used for pre-course reading. It does not deal with practical problems and does a poor job of "step-by-step" explanation.
3. Inadequate supplementary teaching aids are used.
4. No opportunity or methodology is provided for assessing the student's ability to benefit from the instruction.
5. The materials are presented at a rapid pace leaving many students behind.

A competency based format was recommended as the most appropriate and efficient means of providing instruction to water treatment operators in West Virginia. The advantages of the use of competency based curriculum with adults were seen as follows:

1. Only essential on-the-job skills need be acquired. Information about theory and rationale behind practices could be made available to the interested learner while those interested in acquiring only the necessary basic skills would be provided for.
2. "Students" can opt to be evaluated on a competency at any time. A person already skilled in a particular area can receive credit and move on to more challenging competencies.
3. Competency based curriculum places no restrictions on the minimum or maximum amount of time required to master a unit of study. No participants need become bored or be left behind. It is truly a "self-pacing" format.

4. Participants work to acquire the competencies in the field where the equipment, setting, and day-to-day routine and mishaps are available as learning tools. No simulation is required.
5. The units of study (competencies grouped by subject area) were designed to be "open-entry/open-exit". The twelve units can be used as a total course of study if desired, but each unit is a complete instructional unit in and of itself. It is not necessary that any particular unit precede any other. Participants need only select the unit(s) in which they are interested.
6. "Evaluators" are persons who are presently working in the field of water treatment technology. Every evaluator is certified as a Class III or IV operator (highest certification classes in West Virginia). These persons have made themselves available to the participants whenever questions arise.

Hertling[1] has suggested that competency based education and individually paced instruction are particularly suited to adults because they often possess practical experience which may enable them to demonstrate sufficient specific competencies without taking formal course work.

Jones[2] indicates that competency based education is very valuable in conducting continuing education programs for keeping workers upgraded in advancing technologies.

[1]Hertling, James E., Competency Based Education: Is it Applicable to Adult Education Programs? Adult Leadership; 23; 2; 50-2, June 1974.

[2]Jones, Harry, Competency Based Education: The Emerging Center of Leadership. ED 104 862.

COOPERATIVE EDUCATIONAL EFFORT

This project has been a joint effort of three groups. The West Virginia Bureau of Vocational Technical and Adult Education provided the expertise related to curriculum development and evaluation. The West Virginia Department of Health provided support in the legal aspects of water treatment technology in the state. Persons from private water companies provided guidance as to the day-to-day process of water plant operation--the equipment, processes, and practices involved.

Municipal water suppliers are the primary employers of water treatment technicians in West Virginia and the State Health Department controls their certification. Therefore, this instructional program is developed and should be implemented as a cooperative effort between these two agencies and vocational education. Russell[3] and Ribbens[4] report that cooperative efforts between education and industry are possible and very desirable and may be the most appropriate way to upgrade the skills of present workers.

APPROACH

As stated above, this project has been a cooperative effort between vocational education, the State Department of Health, and the water treatment industry. To facilitate and insure this cooperation a team of three project co-directors and two consultants were used. (Many other persons provided "consultant" service throughout the

[3]Russell, Wendell, Upgrading in an Industrial Setting, Final Report. ED 092 662.

[4]Ribbens, Harvey, Try it, You'll Like It. T and I Adult Education in Partnership with Industry, American Vocational Journal; 48; 5; 41, May 1973.

duration of the project.) T. A. Welty, West Virginia Coordinator of Public Service Occupations Education for the Bureau of Vocational, Technical, and Adult Education, served as administrative co-director and was committed to 10% time on the project for its duration. The other co-directors were Donald Kuntz and David Ball, Sanitation Engineers with the West Virginia Department of Health. They were each committed to 10% time on the project. The two industry, consultants were Ernest Stricklan, Manager of the Hurricane, West Virginia water works plant and Harley Brown, Chief Operator of the Buckhannon, West Virginia water treatment plant. The primary responsibilities of the industry consultants was to aid in the determination of competencies required by water treatment technicians and to review and evaluate the instructional program.

Project operation, curriculum writing, evaluation, and report preparation were the responsibilities of Melinda Ross-Harrington, the full-time Project Coordinator.

COMPETENCY IDENTIFICATION

The first step taken toward the identification of appropriate competencies was a review of existing literature on water treatment and related topics. The search included use of the ERIC system and the AIM/ARM index. Although there was an abundance of wastewater related materials, fewer materials directly related to water treatment were available. Requests for information were simultaneously sent out to commercial publishers and profit and non-profit organizations with interests related to water treatment (Appendix B).

The response from commercial publishers was scant. The response from profit and non-profit organizations was more encouraging, but again, most materials were specifically designed for use in wastewater treatment.

During the second week of the project a meeting was held with the Project Coordinator and the co-directors from the West Virginia State Department of Health and the West Virginia State Department of Education, Bureau of Vocational, Technical, and Adult Education. The purpose of this meeting was to allow an opportunity for all members to become acquainted and to discuss the strategy by which the curriculum would be developed and pilot tested. It was determined that the most efficient strategy would be for the Project Coordinator to develop drafts of both competencies and competency sheets (which contain learning activities, resources, and evaluations). These drafts were then to be reviewed and revised with the input of the project co-directors.

After reviewing available written materials and the West Virginia water treatment technician certification tests, the Project Coordinator thoroughly toured two local water treatment facilities and spent considerable time discussing the implications of the curriculum development project with the plant supervisors.

Next a draft of on-the-job competencies required of Class I and II level operators was developed. In West Virginia, Class I and II indicates the "lower" of four water treatment operator categories. Class I and II plants are generally small, serving small communities with a limited staff. The state certification tests were viewed as

an indication of the State Department of Health's view of priority areas for Class I and II water treatment technicians. Thus, the certification tests were taken into consideration in the development of the list of water treatment technician competencies.

The first list of competencies was reviewed and revised with the help of two sanitary engineers (Department of Health co-directors) who deal regularly with Class I and II operators. Each competency on the list was then categorized according to the class(es) to which it applied and to a "general topic" category. The list was then reviewed and critiqued by all co-directors and two consultants-water treatment plant managers. When all reviewers had had time to critique the list individually, a meeting was held where all reviewers were present. Here, each competency was evaluated according to three criteria: (1) is the competency a necessary on-the-job skill? (2) is the competency appropriate for Class I and/or Class II operators? and (3) is the competency clearly stated? As a result of this meeting, a list of competencies spanning twelve general topic areas was finalized (Appendix C).

It was decided that each of the twelve general topic areas would comprise one instructional module. The twelve areas are:

1. General Plant Operation
2. Taste, Odor, Color
3. Chemistry/Bacteriology
4. Chlorination
5. Fluoridation
6. Filtration
7. Hydraulics
8. Distribution System
9. Pumps
10. Wells
11. Cross-Connections
12. Springs

Each module contains a "competency sheet" for each competency assigned to that category. The format for each competency sheet is designed as follows:

COMPETENCY: *A statement of the competency.*

Objective: *Specific statements of tasks which make up the competency.*

RESOURCES: *A complete list of all materials, tools, etc. necessary to complete the competency as well as additional resources which may be helpful.*

LEARNING ACTIVITIES: *A list of alternative activities, any or all of which may help the learner acquire the skills necessary to perform the competency.*

EVALUATION ACTIVITIES: *One or more activities which will indicate to an evaluator that the learner has acquired the competency. The learner may chose to complete the evaluation at any time s/he feels able to complete it successfully.*

This format is the standardized format used by the West Virginia Bureau of Vocational, Technical, and Adult Education. It is the format with which vocational educators throughout the state are familiar.

DEVELOPMENT OF CURRICULUM MODULES

In West Virginia it was necessary to design instructional modules to be both individualized and self contained in order to avoid geographical constraints. This meant providing all written resource materials with each module and including detailed instructions for any laboratory, mechanical, or maintenance work to be performed by the pilot participants. For the most part, any work

to be done toward achieving a particular competency could be performed in the operators' water treatment plants. If some equipment was not available, arrangements were made by the operator and his/her evaluator to provide all necessary experiences. Occasionally, it was necessary for an operator to visit a nearby water treatment plant.

Once a Class I or II certificate is awarded to a water treatment operator, it is valid throughout the state of West Virginia. Although an operator may have, for example, a hypochlorinator in the plant in which she/he is employed, it is conceivable that she/he could transfer to a treatment plant which uses a gas chlorinator. It is obvious, then, why competencies related to the chlorination *process* must be acquired. This program is designed so that the State Department of Health can be assured that when a person successfully completes a unit of instruction she/he has mastered all the competencies necessary to complete the *processes* involved regardless of variations in equipment or procedures. See Appendix D for example Competency Sheet.

Within a module, each competency sheet is followed by related resource (information) sheets. At the back of each module, appendixes are included. These appendixes include written materials related to the module topic.

Each module deals with the legal responsibilities of the plant operator as well as the knowledge, skills, and safety practices related to the particular subject matter.

The State Department of Health co-directors agreed to provide points toward certification for those pilot participants who successfully completed project modules. Each certification test has a total of 100 possible points. The points for module completion were assigned as follows:

Chlorination	5 points
General Plant Operation	3 points
Filtration	2 points
Pumps	2 points
Taste, Odor, & Color	2 points
Distribution Systems	2 points
Hydraulics	2 points
Fluoridation	2 points
Cross-Connections	2 points
Chemistry/Bacteriology	2 points
Wells	2 points
Springs	2 points

Although completion of a particular module would not significantly affect a score on the certification test, the points were useful as incentive to complete a module once it had been started.

PILOT PARTICIPANT EVALUATION PROCEDURES

Two main factors were involved in the design of these evaluation procedures. First, it is important to note that the Class I and II water treatment plants in West Virginia serve small rural communities. Road conditions would not permit a central location for instruction. It was imperative that operators in training and

other water treatment technicians throughout the state be provided with individualized, self-contained instructional modules which could be completed at their local water treatment plants.

Secondly, in order for these persons to be evaluated, it was necessary to identify qualified personnel throughout the state who would be available on a part time basis to be "evaluators" of the pilot participants who were completing the modules. Eleven Class III and IV operators agreed to participate as evaluators. The State Department of Health does not have adequate staff to provide evaluators, and these operators from across the state were more accessable and, perhaps, less "threatening" than State Department employees.

The evaluators were provided with all curriculum materials in addition to detailed evaluation "keys" for each module with which they were working. Most evaluators were assigned to one or two operators in training in their county. A total of 18 of West Virginia's fifty-five counties are represented. Eleven evaluators were assigned to work with a total of 38 operators in training.

Pilot participants contacted their evaluator when they were ready to be evaluated on one or more of the competencies in the module on which they were working. The evaluator, who had been supplied with the curriculum module, answer keys, and evaluation guidelines scheduled an evaluation session. Evaluation activities were primarily demonstrations of skill and written questions relating to knowledge necessary to perform the skill. (See Appendix E for sample evaluation form.)

If the operator did not complete the evaluation successfully, s/he was able to complete it as many times as necessary (with one-week lapses between administrations) to successfully demonstrate the competency. When all of the evaluations for a particular module were successfully completed, the operator received a certificate of accomplishment (Appendix F) and points which could be added to his/her total score on the West Virginia State Certification Examination. Before the certificate was awarded, the participant and evaluator were required to complete a form designed to evaluate the module.

PRODUCT EVALUATION PROCEDURES

Each pilot participant and his/her evaluator was requested to complete a PRODUCT EVALUATION FORM for each completed module (Appendix G). The purpose of this form was to obtain feedback for revision. Questions relating to the participant's opinion of the most useful resources and learning activities are included. Criticism is encouraged. In completing their forms, evaluators have provided useful insights in relation to specific evaluation items. Additionally, comments have been provided suggesting additional topics that may be covered.

REVISION OF CURRICULUM MODULES

Because of the unusually harsh winter weather, many of the pilot participants spent all of their working hours repairing broken lines and doing whatever else was necessary to maintain service to their customers. As a result, not all modules could be pilot tested. However, the format and procedures for completion of the

modules, which is consistent across all modules, was very well accepted.

One evaluator's comments, in relation to the CHLORINATION module, may provide insight into the response to the curriculum materials: "I believe each competency is very important to all water treatment personnel, whether it be operator or one in charge of water treatment. The objectives helped to better understand the competencies and I feel sure the operators who have taken the tests feel as I do. I am sure the evaluation activities showed the operator whether he could perform the competencies or not. Although I could successfully perform the evaluation activities before I started the chlorination module, I found the competency sheets and resources helped bring back to memory some things I may have forgotten or might have overlooked."

Necessary revisions are of an editorial nature. Any other revisions would most appropriately be completed after a field test of the complete package.

RESULTS

With regard to the original objectives of this project, the results are very encouraging:

1. A cooperative effort between vocational education, the health department, and industry has yielded a product that could not have been developed without the full cooperation of all three groups.

2. A list of competencies required for successful on-the-job performance by Class I and II operators has been identified. It must be noted, however, that without an organized field test of the materials it would be unwise to consider the list conclusive of the Class I and II competencies necessary in West Virginia.
3. An instructional program has been developed which:
   a. is based on competencies determined by persons presently employed in the field
   b. makes use of self-instructional/self-paced modules
   c. is open-entry/open-exit and provides remedial instructions for students with minor deficiencies
   d. uses various types of media to supplement instruction
   e. makes use of actual equipment and practices in an actual work site setting; and
   f. is easily transportable to various locations.
4. Instruments were developed for assessing final competency attainment. Program placement is self-determined.
5. A representative sample of the curriculum modules were pilot tested.
6. Curriculum materials and teaching aids were evaluated as a result of pilot testing. Recommendations for revision follow in "RECOMMENDATIONS" section of this report.
7. Project outcomes have been evaluated by participant and evaluator ratings as well as consultant and staff observations.

Of the 40 pilot participants who requested modules, 6 successfully completed the modules as of this writing. Approximately 12 more participants will be completing their modules shortly. The reaction to the materials by the pilot participants and their evaluators was very positive. Of those who completed modules, the general consensus was that a self-paced/self-instructional competency based format was ideal for presently employed operators. Those who requested modules but did not complete them, indicated time constraints (related to the unusually cold winter) as their primary problem. However, it may also be the case that a small group setting might be more effective for some operators while a completely individualized setting is more appropriate for others.

RECOMMENDATIONS

As stated above, with regard to the project objectives, the results of the program indicate that an efficient means of instruction has been developed. However, because of the small scale of the pilot test, a field test of the complete package is highly recommended. Some of the questions which might be addressed in a field test are:

1. Are the competencies indeed conclusive of the on-the-job skills <u>necessary</u> for successful job performance by Class I and II water treatment operators in West Virginia?
2. Can the materials be used effectively as a package program? If so, what instructional sequence(s) is most efficient?
3. Does successful completion of the modules relate to successful performance on state certification examinations?

4. If the modules are effective as a conclusive instructional sequence, representative of necessary on-the-job skills, should the sequence be used in lieu (or in addition to) the state certification examinations?
5. Can the materials be used successfully in a small group in-the-field setting for those who prefer the atmosphere of a small group to individualized study?
6. How many participants can be adequately served by one evaluator?
7. What alternate forms of evaluation are effective with this type of curriculum?

CONCLUSIONS

Competency based (self-paced/self-instructional) materials can be used effectively as an instructional method with water treatment operators in West Virginia. The number of certified water treatment operators in the state is not adequate to provide efficient service to the growing number of consumers.

Various means of instruction should be provided for potential operators. Various learning styles should be taken into consideration to avoid the "one best method" routine which inevitably excludes some potentially successful students. Competency based curricula is one approach which has proved useful on the basis of this pilot study.

The twelve curriculum modules developed as a part of this project represent at least an adequate number of specific on-the-job

competencies necessary for satisfactory job performance. The importance of the availability of safe, clear, odorless water can not be underestimated. The consuming public will not tolerate objectionable or unsafe drinking water. The technology is available to provide potable water to any consumer requesting it. It is now necessary to provide instructional assistance to practicing and potential water treatment operators to keep up with the growing demand for clean, safe water.

APPENDIX A:

"CBE, WEST VIRGINIA STYLE"

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DANIEL B. TAYLOR
STATE SUPERINTENDENT
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June 8, 1977

CBE, WEST VIRGINIA STYLE

The Bureau of Vocational, Technical and Adult Education in the State Department of West Virginia advocates the use of competency-based education (CBE) curriculum. The following paragraphs provide a description of Competency Based Education recommended by the West Virginia Vocational Education Bureau.

CBE DEVELOPMENT

CBE, as it is being developed in West Virginia, can be used in the complete range of instructional methods from lecture-demonstrations to the completely student-centered individualized approach.

The first step in developing CBE curriculum within an occupational area is to determine the competencies or tasks (skills, attitudes and knowledges) that will provide your students with at least job entry skills in your given occupational area. These competencies may already be available through the Vocational-Technical Education Consortium of States (V-TECS) catalogs or through the State Vocational Curriculum Laboratory or other sources where a task analysis has already been done. Using the V-TECS catalog and other available task or competency lists, work with your local advisory committee to complete your competency list and validate it.

The completed list should be an accurate representation of the tasks performed by local workers in your occupational area.

Step number two consists of organizing the competencies into a logical learning sequence. This is done by progressing from simple to complex competencies and then grouping the competencies into natural learning units or modules. Where V-TECS catalogs are available, this is already partially done.

With the competencies identified, sequenced and grouped, step number three is to actually write out your competency sheets for each unit or module. In the West Virginia Vocational Bureau Model*, the words Student Competency Sheets are written across the top of the page. The next heading on the left-hand side is Competencies, followed by statements of the specific competencies. These competencies consist of very brief statements which indicate the skills and/or attitudes and/or knowledges to be covered on this competency sheet.

The next heading on the left side of the competency sheet is Objectives, followed by the stating of the objectives. Where your competencies are consistent with the V-TECS catalog, your performance objectives are already written. You will need only to write objectives where you have added competencies. A behaviorally stated performance objective (as in V-TECS) includes: (1) the material and environmental limits or conditions required to master the competency, (2) a detailed description of the student action to be demonstrated and (3) the standards for evaluating mastery of the competency. If, however, the materials, conditions, and evaluation are going to be listed

* See example format in appendix

under separate headings, you may not want to include them as part of the objective. The objective should be whatever is comfortable for you and the student to use. The objective, therefore, may consist of, (1) the complete performance objective as previously mentioned, (2) only a description of the student action or (3) some combination of both.

The next left-hand heading on the competency sheet is Learning Activities followed by a listing of all activities and resources which will assist the students in mastering the competencies. These learning activities can range from large group activities to small group activities to individualized activities and should include all three categories. The large group activities can include lecture-demonstration activities, field trips, or anything else that can be done that will help the students as a large group master the competencies. Small group activities can consist of things that can happen in or outside the classroom with any number of resources or people used to assist the students. Individualized activities usually consist of using slides, filmstrips, textbooks, manuals, one-to-one relationships with qualified personnel within the school setting, films, and other materials that are available to the student which will assist the student in mastering the competencies. Another type of learning activity which can be included, is a detailed set of instructional steps for mastering the competencies. These steps are available in the V-TECS catalogs under "Performance Guide."

The next left-hand heading of the competency sheet is Evaluation or Criterion Evaluation followed by a statement of the evaluation procedures. This statement of evaluation procedures needs to be more than just a statement saying, "you will be evaluated by the teacher" or a statement that says, "do it to the satisfaction of the teacher". Since it is possible that these competency sheets will be used on an individualized basis, it is necessary in the evaluation to list a standard which students can turn to so they will know whether or not they have successfully mastered each competency. Standards may be a manual, a description in a textbook, a poster, a bulletin board or anything available that students can turn to and determine whether or not they have successfully mastered each competency.

The format for competency-based instruction which has just been described, allows flexibility which should help make you and your students more comfortable in the classroom. CBE curriculum currently under development in West Virginia will be using variations of this format. If you are familiar with some variation of this format, then much of the CBE curriculum coming out of the W. Va. State Vocational Curriculum Laboratory will be very easy for you to adopt and adapt for your own usage.

PRE-TEST

If a student, due to prior experience is capable of completing a competency, module, or set of modules in a given occupational area, there is really no need to insist that the student run through all the associated modules or learning activities. In such a case, recommended

procedures for pre-testing a student would be to allow the student to complete a sequence of evaluation items from a competency sheet or sheets. If a student does test out competent in all or at least some of these competencies, then it stands to reason that the student would only need to work on the competencies that he or she has missed.

POST-TEST

If at the end of a group of units, it is desirable or required to test a student's overall performance, usually the individual evaluations or the most complex evaluation from previous competency sheets will be all that is necessary. In many cases, if students have already passed a series of written tests and performance tests to determine their skills, attitudes and knowledges, the overall test may not be necessary.

CAREER EDUCATION AND CBE

There is one further consideration in the development of CBE curriculum and that is in the area of Career Education. The competency sheet format which has previously been described is used primarily for skill preparation areas in vocational-occupational programs. In developing CBE curriculum for pre-vocational/career education exploration, it is necessary to add another dimension to the objectives and evaluation items. This additional dimesion is the students' attitude toward learning in the occupational area.

In pre-vocational/career exploration, it is necessary, not only

to determine whether or not the students have mastered exploratory competencies, but to determine what the student's attitude is toward using the competencies. It is, therefore, necessary in stating the objectives and evaluations to include the fact that the student's attitude toward employment in this occupational area will be evaluated. It is then necessary to write into the evaluation some type of items through which the students can identify, (1) how well they would like to be employed doing these types of competencies, (2) whether or not they feel qualified to accomplish these competencies and (3) how well they like the required training program.*

SUMMARY

The previous paragraphs have been provided to you in an effort to inform you of how CBE curriculum is being developed in Vocational Education in the State of West Virginia. This mode of curriculum development and usage is being recommended by the Vocational Bureau and is meant to be adapted to suit individual teacher and student needs. No part of this description is mandatory, but merely recommended.

*See Student Attitude Sheet in Appendix

CBE, West Virginia Style was prepared by Dr. Fred W. Harrington, Curriculum Coordinator, Bureau of Vocational, Technical and Adult Education, Capitol Complex, Building #6 Room B-230, 1900 Washington St. E., Charleston, WV 25305 (304) 348-2949

APPENDIX

EXAMPLE FORMAT

STUDENT COMPETENCY SHEET

Competencies:

Objectives:

Learning Activities:

Evaluation:

EXAMPLE COMPETENCY SHEET

STUDENT COMPETENCY SHEET

UNIT: 16 First Aid

COMPETENCY STATEMENT: 03 Basic Cardiac Emergency Care

PERFORMANCE OBJECTIVE: 06 Given access to Rescusci-Annie, you will demonstrate your knowledge of external cardiac compressions by finding and correctly placing the heel of your hands on the sternum. You will perform with 100% accuracy external cardiac compressions according to the skills practice found in Cardiopulmonary Resuscitation, Unit Six, pages 21-23, for a two minute period of time. You may not use references.

LEARNING ACTIVITIES:

1. Read Cardiopulmonary Resuscitation, self-instruction booklet, Unit Six, "External Cardiac Compression." Take notes and add the glossary terms found on page three to your vocabulary list.

2. Read Unit 30, Nursing Skills for Allied Health Services, Volume Two, Cardiopulmonary Resuscitation.

3. If available in Instructional Media Center, view Allied Health Assistant slides with a study guide, "History of Resuscitation." Discuss the material you viewed with your instructor.

4. In the laboratory with Resusci-Annie, practice the caliber and two finger placement over the xphoid process of the sternum, of locating the chest position to perform external cardiac compressions.

5. Practice performing external cardiac compressions in the laboratory, using Resusci-Annie, under the direction of your instructor.

CRITERION EVALUATION:

Given access to Resusci-Annie, you will demonstrate your knowledge of external compressions (cardiac) by finding and correctly placing the heel of your hands on the sternum. You will perform with 100% accuracy external cardiac compressions according to the skills practice found in Cardiopulmonary Resuscitation, Unit Six, pages 21-23, for a two minute period of time. You may not use references.

Taken from West Virginia's Nursing Assistant Student Curriculum available from the West Virginia Vocational Curriculum Lab, Cedar Lakes Conference Center, Ripley, West Virginia 25271

PUBLIC SERVICE EDUCATION PROGRAM

Student Attitude Sheet

Please check the block which best describes your feeling toward the activities which you have just completed.

SKILLS OR ACTIVITIES	Enjoyed it very much	Liked it	Didn't like it or didn't dislike it	Not very interesting	Didn't enjoy any part of it
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11. Are you qualified for entering this type of work?					
12. What do you think of training involved in this type of work?					
13. Would you like to find out more about this area of work?					

14. Comments _____

_____

_____

_____

_____

Developed at Raleigh County Workshop, Beckley, West Virginia 1976

APPENDIX B:

COMMERCIAL PUBLISHERS and PROFIT AND NON-PROFIT ORGANIZATIONS CONTACTED FOR INFORMATION RELATING TO WATER TREATMENT TECHNOLOGY

Commercial Publishers and Profit and
Non-Profit Organizations Contacted for Information
Relating to Water Treatment Technology

Publishers

Addison-Wesley Publishing Co., Inc.
Reading, Massachusetts 01867

Doubleday and Company, Inc.
501 Franklin Avenue
Garden City, New York 11513

E. P. Dutton & Company
201 Park Avenue South
New York, N. Y. 10003

Harcourt, Brace & World, Inc.
757 3rd Avenue
New York, N. Y. 10017

Harper and Row, Publishers
49 E. 33rd Street
New York, N. Y. 10016

D. C. Heath & Company
285 Columbus Avenue
Boston, Massachusetts 02116

Macmillan Company
60 5th Avenue
New York, N. Y. 10011

McGraw-Hill Book Company, Inc.
330 W. 42nd Street
New York, N. Y. 10036

Northwestern University Press
1735 Benson Avenue
Evanston, Illinois 60201

Prentice-Hall, Inc.
Englewood Cliffs, New Jersey 07632

Random House, Inc.
457 Madison Avenue
New York, N. Y. 10022

Science Research Associates
259 E. Erie Street
Chicago, Illinois 60611

Stanford University Press
Stanford, California 94305

Profit & Non-Profit Organizations

American Academy of Environmental Engineering
P. O. Box 9728
Washington, D. C. 20016

American Water Works Association, Inc.
2 Park Avenue
New York, N. Y. 10016

Conference of State Sanitary Engineers
New York State Department of Health
84 Holland Avenue
Albany, New York 12208

Institute of Environmental Sciences
34 South Main Street
Mt. Prospect, Illinois 60057

Institute of Sanitation Management
55 West 42nd Street
New York, N. Y. 10036

National Association of Sanitarians
University of Denver
Denver, Colorado 80203

Water Pollution Control Federation
3900 Wisconsin Avenue
Washington, D. C. 20016

APPENDIX C:

LIST OF CLASS I & II

WATER TREATMENT OPERATOR COMPETENCIES

FINALIZED COMPETENCIES

CLASS I & II WATER TREATMENT OPERATORS

Subject Area	Competencies	Operator Class
General Plant Operation	1. State your legal responsibility as a plant operator for providing potable water to your customers.	I, II
	2. Sketch and label a diagram which represents the basic parts of your water treatment plant.	I, II
	3. Identify the sources of water available to your treatment plant.	I, II
	4. Accurately complete the "Monthly Operation Report" required by the W. Va. Department of Health.	I, II
	5. Using data gathered over a one week period, draw a graph showing the daily variation in water demand for your system.	I, II
	6. Determine the average amount of "reserve" water which should be kept available for your system.	I, II
	7. Describe the advantages and disadvantages for <u>your treatment area</u> of clear well storage and elevated storage in the distribution system.	I, II
	8. Sketch, label, and describe the basic parts of a storage tank including foundation, valves, vents, and access parts.	I, II
	9. Describe the procedure you would follow to inform the public if you knew ahead of time that the water would have to be shut off for a period of time.	I, II

Taste, Odor, and Color	10. Demonstrate the ability to test your finished water for taste and odor and perform necessary corrections.	II
	11. Describe the best procedure for the control of algae at your treatment plant.	II
	12. Perform tests to determine the level of turbidity of your finished water.	II
Chemistry/Bacteriology	13. Identify and describe the cause and effect of water borne diseases which can make people ill.	I, II
	14. Demonstrate the ability to gather, package, and send representative water samples for performing bacteriological and chemical lab tests.	I, II
	15. Determine the amount of manganese present in your raw and finished water.	I, II
	16. Determine the amount of iron present in your raw and finished water.	I, II
	17. Determine the amount of "hardness" for your raw and finished water.	II
	18. Determine the pH levels for your raw and finished water.	I, II
	19. Describe the process of coagulation and the purpose it serves in water treatment.	II

	20. Perform a "jar test" to determine the chemical dosage and pH level at which water in your plant flocs best.	II
	21. Determine the pH level most appropriate for controlling corrosion in your service area.	I, II
	22. Perform an alkalinity test on your raw and finished water.	I, II
	23. Determine the rate of feed for each chemical dry feeder in your treatment plant and accurately measure the correct amount of dry chemical and add it to each dry feeder in your plant.	II
	24. Determine the rate of feed for each chemical solution feeder in your treatment plant and prepare a solution of uniform strength for use in each solution feeder in your plant.	I, II
Chlorination	25. Describe the purpose and process of chlorination.	I, II
	26. Describe each of the following: (a) total chlorine residual (b) free chlorine residual (c) combined chlorine residual	I, II
	27. Demonstrate the ability to determine the amount of free chlorine present in water.	I, II
	28. Determine the chlorine demand for raw water entering your treatment plant.	I, II
	29. Sketch, label, and describe the operation of the chlorinator in your treatment plant.	I, II

	30. Demonstrate the use of a gas chlorinator employing all appropriate safety precautions.	I, II
	31. Demonstrate the use of correct first aid procedures for someone who has been overcome with chlorine gas.	I, II
	32. Demonstrate the ability to prepare comparable hypochlorite solutions with uniform chlorine strength using three different strength hypochlorite compounds.	I, II
	33. Demonstrate the proper use of a hypochlorinator.	I, II
Fluoridation	34. Describe the purpose and process of fluoridating water.	I, II
	35. Determine the correct dosage of fluoride for your water treatment system using the West Virginia Public Water Supply Regulations.	II
	36. Demonstrate the mixing of fluoride compounds and disposal of bags while exhibiting the proper use of all necessary protective equipment.	II
Filtration	37. Describe the purpose of sedimentation basins and flocculation units and explain how they work.	II
	38. Sketch, label, and describe a rapid sand filter and a pressure filter.	I, II
	39. Demonstrate the ability to inspect your filter for cracks, mudballs, and other imperfections.	II

	40. Describe the purpose and step-by-step procedure for backwashing a filter in your treatment plant.	II
	41. Determine, on the average, how often the filter(s) in your treatment plant should be backwashed.	II
	42. Backwash a filter in your plant for an appropriate amount of time while opening and closing the valves in the proper order.	II
Hydraulics	43. Determine the head loss for two pipes connected in a series.	I, II
	44. Using the chart provided, determine the friction loss of water in three different sections of line in the distribution system.	I, II
	45. Demonstrate the ability to convert pressure measurements from psi (pounds per square inch) to feet of head.	I, II
Distribution System	46. Describe three types of pipe that could be used in a water system and the advantages of each.	I, II
	47. Identify and describe all types of valves used within your plant and distribution system.	I, II
	48. Describe the types of main line meters and customer meters used by your treatment plant. If no meters are presently used, describe those which you think would be most appropriate.	I, II

	49. Demonstrate the ability to disinfect new and repaired lines and storage tanks.	I, II
Pumps	50. Sketch, label, and describe the various types of pumps used within your treatment plant and distribution system.	I, II
	51. Demonstrate the ability to perform necessary repairs on the pumps within your treatment plant and distribution system.	I, II
	52. Perform a maintenance check on all pumps in your plant, keeping accurate records of your maintenance checks.	I, II
Wells	53. Describe the difference between dug, drilled, and driven wells.	I, II
	54. Describe the various types of aquifers from which wells may derive water.	I, II
	55. Sketch a deep well labeling all the parts including the following: gravel wall screen casing cement seal pump bowls casinghead appurtenances vent blowoff drawdown gauge drop line and/or sensors	I, II
	56. Describe the purpose of a yield and drawdown test for a new well.	I, II
	57. Describe the purpose of the well <u>screen</u> and tell what you do to maintain it.	I, II

Cross-Connections	58. Define cross-connections and explain how a cross-connection could affect people in your service area.	I, II
	59. Describe the different methods of cross-connection control.	I, II
Springs	60. Sketch, label, and describe the construction of a spring basin.	I, II
	61. Describe how to properly protect a spring to be used for potable water.	I, II

APPENDIX D:

SAMPLE COMPETENCY SHEET

COMPETENCY: Demonstrate the ability to prepare comparable hypochlorite solutions with uniform chlorine strength using three different strength hypochlorite compounds.

Objective: Identify three sources of chlorine that can be used to make hypochlorite solutions.

Objective: Perform the correct mathematical calculations to determine the strength of hypochlorite solutions.

RESOURCES:

(a) Laundry bleach (5% sodium hypochlorite)

(b) Commercial laundry bleach (15% sodium hypochlorite)

(c) Dry hypochlorite (70% calcium hypochlorite)

(d) BASIC WATER TREATMENT OPERATOR'S MANUAL, No. M 18, American Water Works Association, 2 Park Avenue, New York, N. Y. 10016, pp. 50-52. *-Resource Sheet Part I-*

(e) Manual of Instruction for Water Treatment Plant Operators, New York State Department of Health, Health Education Service, P.O. Box 7283, Albany, N. Y. 12224, pp. 157-58.

LEARNING ACTIVITIES:

(a) Read the recommended resources to find information about preparing hypochlorite solutions.

(b) Prepare a 1% chlorine solution (10,000 ppm) using *LAUNDRY BLEACH (5% sodium hypochlorite).*

The easiest way to prepare a sodium hypochlorite solution is by *dilution.* To dilute a one gallon bottle of laundry bleach (5% sodium hypochlorite) to a 1% solution:
(Note: the % is expressed as a decimal: 1% = .01)

$$\underline{\text{Feed}}\ \text{Unknown (gallons)} = \frac{\text{gallons of sodium hypochlorite} \times \text{decimal percent of sodium hypochlorite}}{\text{desired strength of solution (decimal percent)}} = \boxed{\quad}\ \text{ANSWER}$$

Fill in the equation to:

$$\text{Unknown (gallons)} = \frac{1 \times .05}{.01} = \boxed{5 \text{ gallons}}$$

That means you must have 5 gallons of solution to have a 1% solution.

Here's another example: If you want to dilute a 5 gallon bottle of laundry bleach (5% sodium hypochlorite) use the same formula.

$$\text{Feed Unknown (gallons)} = \frac{\text{gallons of sodium hypochlorite} \times \text{decimal percent of sodium hypochlorite}}{\text{desired strength of solution (decimal percent)}} = \boxed{} \text{ ANSWER}$$

Fill in the equation to:

$$\text{Unknown (gallons)} = \frac{5 \times .05}{.01} = \boxed{25 \text{ gallons}}$$

(c) Prepare a 1% chlorine solution (10,000 ppm) using *COMMERCIAL LAUNDRY BLEACH (15% sodium hypochlorite)*.

Use the same formula used above to dilute a 5 gallon bottle of commercial laundry bleach (15% sodium hypochlorite) to a 1% solution.

$$\text{Feed Unknown (gallons)} = \frac{\text{gallons of sodium hypochlorite} \times \text{decimal percent of sodium hypochlorite}}{\text{desired strength of solution (decimal percent)}} = \boxed{} \text{ ANSWER}$$

Fill in the equation to:

$$\text{Unknown (gallons)} = \frac{5 \times .15}{.01} = \boxed{75 \text{ gallons}}$$

(d) Prepare a 1% chlorine solution (10,000 ppm) using *CALCIUM HYPOCHLORITE (70%)*. Calcium hypochlorite is a dry chemical. It must be dissolved in water. Calcium hypochlorite compounds will retain their chlorine content for several months if it is stored in a cool area. Once a container is opened, loss of chlorine may occur, especially if exposed to moisture in the air. If exposed hypochlorite is used, more material may be needed to get the right chlorine concentration.

Assume that the chemical will be mixed in a 30 gallon drum. This is the size drum usually used in treatment plants in West Virginia.

To prepare a 1% chlorine solution (10,000 ppm) using calcium hypochlorite (70%) use the following formula:

$$\text{weight of chemical (pounds)} = \frac{\text{strength of solution (ppm)}}{120{,}000} \times \frac{\text{gallons of solution (gallons)}}{\text{strength of dry chemical (decimal percent)}}$$

$$\text{1 pound calcium hypochlorite} = \frac{10{,}000 \times 30}{120{,}000 \times .70} = \boxed{3.57 \text{ pounds}}$$

You need to dissolve approximately 3.6 pounds of 70% calcium hypochlorite in 30 gallons of water to prepare a 1% chlorine solution.

Remember: put about 90% of the solution into the hypochlorinator feed tank and *throw away the remaining solution.* The remaining solution contains the calcium precipitate that builds up and eventually clogs the feeder.

EVALUATION ACTIVITIES: You will be required to prepare three comparable hypochlorite solutions. You will be given the strength of the compounds and the formulas to use. You may use a calculator. All of your answers must be correct. You must show your calculations on the answer sheet.

After you have answered all three problems correctly, you must actually prepare the three solutions while your Evaluator observes you.

APPENDIX E:

SAMPLE EVALUATION SHEET

APPENDIX F:

SAMPLE "CERTIFICATE OF ACCOMPLISHMENT"

WATER TREATMENT TECHNOLOGY

FLUORIDATION

This hereby certifies that on this date _____

_____ has successfully completed a course of study in the process of Fluoridation and the operation, maintenance, and safety precautions related to Fluoridation .

WEST VIRGINIA STATE DEPARTMENT OF HEALTH

WEST VIRGINIA BUREAU OF
VOCATIONAL, TECHNICAL AND ADULT EDUCATION

APPENDIX G:

PART I: SAMPLE PRODUCT EVALUATION FORM

PART II: EXAMPLE OF COMPLETED PRODUCT EVALUATION FORM

Directions: *Look at Competency Sheet #33. Answer each of the questions below about this Competency Sheet. Be sure to answer every question.*

1. Do you think the COMPETENCY is important for you on your job?
"Demonstrate the ability to prepare comparable hypochlorite solutions with uniform chlorine strength using three different strength hypochlorite compounds."

_____	_____	_____	_____
yes very important	yes somewhat important	no useful, but not important	no useless to me on my job

2. Did the OBJECTIVES help you to understand the Competency?

____ yes, the OBJECTIVES helped me to understand the Competency.

____ no, the OBJECTIVES did not help me understand the Competency.

____ no, the OBJECTIVES confused me. Then I could not understand the Competency.

3. Put a check next to each of the RESOURCES that you used:

____(a)

____(b)

____(c)

____(d)

____(e)

Put a circle around the RESOURCES (above) that helped you most.

4. What LEARNING ACTIVITIES did you do?

____(a)

____(b)

____(c)

____(d)

Put a circle around the LEARNING ACTIVITIES (above) that helped you most.

GO ON TO NEXT PAGE

5. How many times did you complete the EVALUATION ACTIVITY for this Competency Sheet?

____ once

____ twice

____ three or more times

6. Do you think the EVALUATION ACTIVITY showed whether you could really perform the competency?

____ yes

____ no

Comments: _____

7. Do you think your Evaluator gave you a fair evaluation?

____ yes

____ no

Comments: _____

8. Did you need help before you were ready for the EVALUATION ACTIVITY or were the Competency Sheet and Resources enough?

_____ I needed another person to help me.

_____ The Competency Sheet and Resources were all I needed.

_____ I could successfully perform the EVALUATION ACTIVITY before I started the Chlorination module.

9. How do you rate this Competency Sheet overall?

excellent	good	(neutral)	poor	very poor

10. How would you like to see this Competency Sheet changed?

_____

_____

Received 7/12/77

Special Note. I appreciate the professionalism and courtesy shown by all concerned. Glad that the course was organized by a person or persons who know what they were doing.
[redacted]
7/10/77

Water Treatment Technology

FILTRATION

PRODUCT EVALUATION FORM

Operator [redacted]

Evaluator _____

Date completed evaluations received _____

Please refer to your copy of the FILTRATION water treatment technology unit when you complete this form. Your certificate of accomplishment will be mailed as soon as the completed form is returned.

(Filtration #38)
Product Evaluation Form

Directions: *Look at Competency Sheet #38. Answer each of the questions below about this Competency Sheet. Be sure to answer every question.*

1. Do you think the COMPETENCY is important for you on your job? *"Describe the purpose of sedimentation basins and flocculation units and explain how they work."*

yes very important	yes somewhat important	no useful, but not important	no useless to me on my job
✓			

2. Did the OBJECTIVES help you to understand the Competency?

   ✓ yes, the OBJECTIVES helped me to understand the Competency.

   ___ no, the OBJECTIVES did not help me understand the Competency.

   ___ no, the OBJECTIVES confused me. Then I could not understand the Competency.

3. Put a check next to each of the RESOURCES that you used:

   ✓ (a)

   ✓ (b)

   Put a circle around the RESOURCE (above) that helped you most.

4. What LEARNING ACTIVITIES did you do?

   ✓ (a) *

   ✓ (b)

   Put a circle around the LEARNING ACTIVITY (above) that helped you most.

* Since I am an operator in Training, I was already familiar with most of water treatment practices so the reading material did more to provide depth and understanding. The questions (b) did provide insight, however.

GO ON TO NEXT PAGE

5. How many times did you complete the EVALUATION ACTIVITY for this Competency Sheet?

✓ once

___ twice

___ three or more times

6. Do you think the EVALUATION ACTIVITY showed whether you could really perform the competency?

✓ yes

___ no

Comments: _____

7. Do you think your Evaluator gave you a fair evaluation?

✓ yes

___ no

Comments: _____

8. Did you need help before you were ready for the EVALUATION ACTIVITY or were the Competency Sheet and Resources enough?

✓ I needed another person to help me. In locating some blueprints for research

___ The Competency Sheet and Resources were all I needed.

___ I could successfully perform the EVALUATION ACTIVITY before I started the Filtration module.

9. How do you rate this Competency Sheet overall?

✓				
excellent	good	(neutral)	poor	very poor

10. How would you like to see this Competency Sheet changed?

_____

_____

(Filtration #39)
Product Evaluation Form

Directions: *Look at Competency Sheet #39. Answer each of the questions below about this Competency Sheet. Be sure to answer every question.*

1. Do you think the COMPETENCY is important for you on your job? *"Sketch, label, and describe a rapid sand gravity filter and a rapid sand pressure filter."*

___ yes very important	✓ yes somewhat important	___ no useful, but not important	___ no useless to me on my job

2. Did the OBJECTIVES help you to understand the Competency?

✓ yes, the OBJECTIVES helped me to understand the Competency.

___ no, the OBJECTIVES did not help me understand the Competency.

___ no, the OBJECTIVES confused me. Then I could not understand the Competency.

3. Put a check next to each of the RESOURCES that you used:

✓ (a)

✓ (b) both seemed good.

✓ (c)

Put a circle around the RESOURCES(above) that helped you most.

4. What LEARNING ACTIVITIES did you do?

✓ (a)

✓ (b)

___ (c) partly

✓ (d)

✓ (e)

Put a circle around the LEARNING ACTIVITIES (above) that helped you most.

GO ON TO NEXT PAGE

5. How many times did you complete the EVALUATION ACTIVITY for this Competency Sheet?

__✓__ once

____ twice

____ three or more times

6. Do you think the EVALUATION ACTIVITY showed whether you could really perform the competency?

__✓__ yes

____ no

Comments: _____

7. Do you think your Evaluator gave you a fair evaluation?

__✓__ yes

____ no

Comments: _____

8. Did you need help before you were ready for the EVALUATION ACTIVITY or were the Competency Sheet and Resources enough?

__✓__ I needed another person to help me. I'm getting a blueprint & overview

____ The Competency Sheet and Resources were all I needed.

____ I could successfully perform the EVALUATION ACTIVITY before I started the Filtration module.

9. How do you rate this Competency Sheet overall?

excellent	good	(neutral)	poor	very poor
	✓			

10. How would you like to see this Competency Sheet changed?

I'm to need more info on filtration using building & process media

(Filtration #40)
Product Evaluation Form

Directions: *Look at Competency Sheet #40. Answer each of the questions below about this Competency Sheet. Be sure to answer every question.*

1. Do you think the COMPETENCY is important for you on your job? *"Demonstrate the ability to inspect your filter for cracks, mud balls, and other imperfections."*

✓ yes very important	yes somewhat important	yes useful, but not important	useless to me on my job

2. Did the OBJECTIVES help you to understand the Competency?

✓ yes, the OBJECTIVES helped me to understand the Competency.

___ no, the OBJECTIVES did not help me understand the Competency.

___ no, the OBJECTIVES confused me. Then I could not understand the Competency.

3. Put a check next to each of the RESOURCES that you used:

✓ (a) Good & concise -

✓ (b)

✓ (c)

Put a circle around the RESOURCE (above) that helped you most.
All served a purpose.

4. What LEARNING ACTIVITIES did you do?

(a)

(b) Had done this on previous occasions

Put a circle around the LEARNING ACTIVITY (above) that helped you most.

GO ON TO NEXT PAGE

5. How many times did you complete the EVALUATION ACTIVITY for this Competency Sheet?

✓ once

____ twice

____ three or more times

6. Do you think the EVALUATION ACTIVITY showed whether you could really perform the competency?

✓ yes

____ no

Comments: _____

7. Do you think your Evaluator gave you a fair evaluation?

✓ yes

____ no

Comments: _____

8. Did you need help before you were ready for the EVALUATION ACTIVITY or were the Competency Sheet and Resources enough?

____ I needed another person to help me.

____ The Competency Sheet and Resources were all I needed.

✓ I could successfully perform the EVALUATION ACTIVITY before I started the Filtration module. (partly)

9. How do you rate this Competency Sheet overall?

excellent	good	(neutral)	poor	very poor
	✓			

10. How would you like to see this Competency Sheet changed?

_____

_____

(Filtration #41)
Product Evaluation Form

Directions: *Look at Competency Sheet #41. Answer each of the questions below about this Competency Sheet. Be sure to answer every question.*

1. Do you think the COMPETENCY is important for you on your job? *"Describe the purpose and step-by-step procedure for back-washing a filter in your treatment plant."*

✓			
yes very important	yes somewhat important	no useful, but not important	no useless to me on my job

2. Did the OBJECTIVES help you to understand the Competency?

✓ yes, the OBJECTIVES helped me to understand the Competency.

___ no, the OBJECTIVES did not help me understand the Competency.

___ no, the OBJECTIVES confused me. Then I could not understand the Competency.

3. Put a check next to each of the RESOURCES that you used:

✓ (a)

✓ (b)

✓ (c)

✓ (d)

Put a circle around the RESOURCES (above) that helped you most.

4. What LEARNING ACTIVITIES did ~~you~~ do?

✓ (a)

Had observed last summer — ✓ (b)

(c) Our plant procedure is somewhat different

Put a circle around the LEARNING ACTIVITIES (above) that helped you most.

GO ON TO NEXT PAGE

5. How many times did you complete the EVALUATION ACTIVITY for this Competency Sheet?

   ✓ once

   ____ twice

   ____ three or more times

6. Do you think the EVALUATION ACTIVITY showed whether you could really perform the competency?

   ✓ yes

   ____ no

   Comments: _____

7. Do you think your Evaluator gave you a fair evaluation?

   ✓ yes

   ____ no

   Comments: _____

8. Did you need help before you were ready for the EVALUATION ACTIVITY or were the Competency Sheet and Resources enough?

   ____ I needed another person to help me.

   ____ The Competency Sheet and Resources were all I needed.

   ✓ I could successfully perform the EVALUATION ACTIVITY before I started the Filtration module.

9. How do you rate this Competency Sheet overall?

excellent	good	(neutral)	poor	very poor
	✓			

10. How would you like to see this Competency Sheet changed?

Since equipment procedures vary according to design and manufacturer, any list of steps for washing filters is not "gospel"

(Filtration #42)
Product Evaluation Form

Directions: *Look at Competency Sheet #42. Answer each of the questions below about this Competency Sheet. Be sure to answer every question.*

1. Do you think the COMPETENCY is important for you on your job? *"Determine, on the average, how often the filter(s) in your treatment plant should be backwashed."*

✓			
yes very important	yes somewhat important	no useful, but not important	no useless to me on my job

2. Did the OBJECTIVES help you to understand the Competency?

✓ yes, the OBJECTIVES helped me to understand the Competency.

___ no, the OBJECTIVES did not help me understand the Competency.

___ no, the OBJECTIVES confused me. Then I could not understand the Competency.

3. Put a check next to each of the RESOURCES that you used:

✓ (a)

✓ (b)

Put a circle around the RESOURCE (above) that helped you most.

4. What LEARNING ACTIVITIES did you do?

✓ (a)

___ (b)

✓ (c)

___ (d) Already had done

Put a circle around the LEARNING ACTIVITIES (above) that helped you most.

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5. How many times did you complete the EVALUATION ACTIVITY for this Competency Sheet?

___ once Had been observed numerous times incidental to work

___ twice

___ three or more times

6. Do you think the EVALUATION ACTIVITY showed whether you could really perform the competency?

✓ yes

___ no

Comments: _____

7. Do you think your Evaluator gave you a fair evaluation?

✓ yes

___ no

Comments: _____

8. Did you need help before you were ready for the EVALUATION ACTIVITY or were the Competency Sheet and Resources enough?

___ I needed another person to help me.

___ The Competency Sheet and Resources were all I needed.

✓ I could successfully perform the EVALUATION ACTIVITY before I started the Filtration module.

9. How do you rate this Competency Sheet overall?

✓				
excellent	good	(neutral)	poor	very poor

10. How would you like to see this Competency Sheet changed?

Most plant operators can do this in early stages of training, I would imagine - but it is vital that must be performed correctly.

Directions: *Look at Competency Sheet #43. Answer each of the questions below about this Competency Sheet. Be sure to answer every question.*

1. Do you think the COMPETENCY is important for you on your job? *"Backwash a filter in your plant for an appropriate amount of time while opening and closing the valves in the proper order."*

✓			
yes very important	yes somewhat important	no useful, but not important	no useless to me on my job

2. Did the OBJECTIVES help you to understand the Competency?

✓ yes, the OBJECTIVES helped me to understand the Competency.

___ no, the OBJECTIVES did not help me understand the Competency.

___ no, the OBJECTIVES confused me. Then I could not understand the Competency.

3. Put a check next to each of the RESOURCES that you used:

✓ (a)

✓ (b)

Put a circle around the RESOURCE (above) that helped you most.

4. What LEARNING ACTIVITIES did you do?

✓ ~~(a)~~

___ (b) Had done

Put a circle around the LEARNING ACTIVITY (above) that helped you most.

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5. How many times did you complete the EVALUATION ACTIVITY for this Competency Sheet?

____ once

____ twice

____ three or more times

Observed during course of work many times.

6. Do you think the EVALUATION ACTIVITY showed whether you could really perform the competency?

✓ yes

____ no

Comments: _____

7. Do you think your Evaluator gave you a fair evaluation?

✓ yes

____ no

Comments: _____

8. Did you need help before you were ready for the EVALUATION ACTIVITY or were the Competency Sheet and Resources enough?

____ I needed another person to help me.

____ The Competency Sheet and Resources were all I needed.

✓ I could successfully perform the EVALUATION ACTIVITY before I started the Filtration module.

9. How do you rate this Competency Sheet overall?

excellent	good	(neutral)	poor	very poor
✓				

10. How would you like to see this Competency Sheet changed?

Vital but just operators may know prior training

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